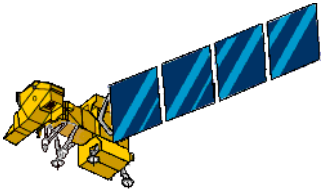


Landsat 7 Technical Session

Backup Charts to Explain:

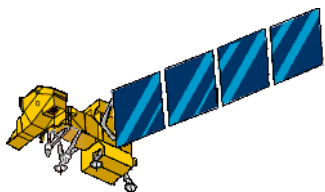
- 1) Relationship Between Video Time Code and PCD Time Code***
- 2) Definition of Interval Header and Trailer***
- 3) Impact on Scheduling of Intervals***
- 4) Intervals and Subintervals***

**Terry Arvidson
Lockheed Martin Missiles and Space
Senior System Engineer in Landsat 7 Project Office**

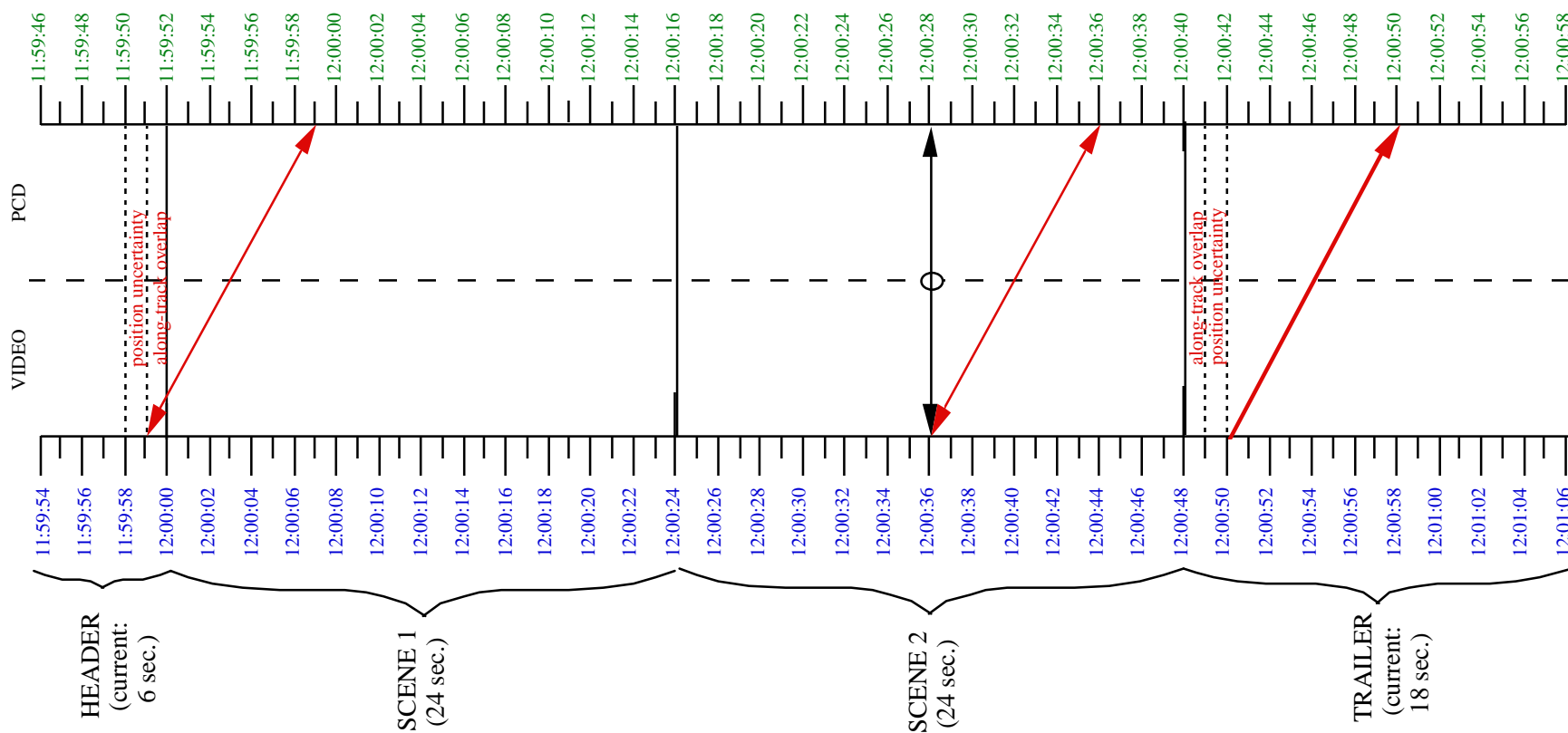


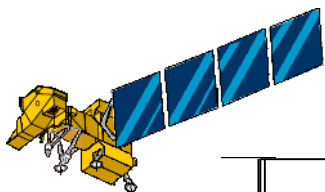
Telemetry Sampling within the PCD

- **Within the 75 Mbps data stream, time code in the PCD is 8 seconds behind time code in the video data (see page 3)**
 - **8 second delay due to time required by flight software to accumulate the telemetry and transfer it to the ETM+ for insertion in the PCD (see page 4)**
 - **applies to all telemetry except ADS and gyro values – these are inserted into the PCD in realtime by the ETM+**
- **Some telemetry points are only sampled once per PCD cycle (once every 16 seconds)**
 - **these include temperature values required for radiometric correction**
 - **must include additional data at the end of desired interval acquisition in order to get the temperature points corresponding to the last scene in the interval (see page 5)**



Relationship between Video and PCD Time



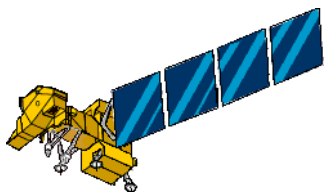


Flight Software Accumulation of Telemetry for PCD

s/c clock captured from PDF;
used by FSW to interpolate best
estimates for att, ephem, et al.

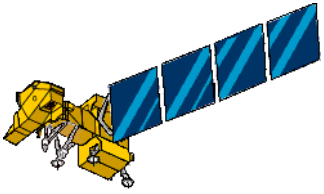
	MF0	MF1	MF2	MF3	MF0	MF1
12:00:00	TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW			
12:00:04		TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW		
12:00:08 MF0 data collect started at this time			TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW	
12:00:12 MF1 data collect started at this time				TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW
12:00:16 MF2 data collect started at this time MF0 data sent to ETM+, collected at 12:00:08; current S/C time from PDF (12:00:16) is also sent to ETM+, is 8 seconds later than MF0 collect time	TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW			
12:00:20 MF3 data collect starts MF1 data sent to ETM+, collected at 12:00:12; timecode in MF0 is 4 seconds later		TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW		
12:00:24 MF2 data sent to ETM+, collected at 12:00:16, same as the timecode in MF0			TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW	
12:00:28 MF3 data sent to ETM+, collected at 12:00:20, timecode in MF0 is 4 seconds earlier				TRANSFER TO ETM+	BUFFER TO PDF	COLLECT BY FSW

FSW = Flight Software
MF = Major Frame
PDF = Payload Data (PCD) Formatter



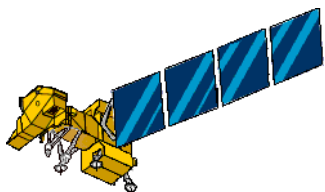
Definition of Interval Header and Trailer

- **Six seconds of header data added to beginning of interval**
 - 1 second for along-track scene overlap for first scene
 - 1 second to account for uncertainty in Scheduler's knowledge of WRS start time
 - 4 seconds to get an additional PCD major frame prior to start of video data to make sure all gyro and ADS values for first scene are included
- **Eighteen seconds of trailer data added to end of interval**
 - 1 second for along-track scene overlap for last scene
 - 1 second to account for uncertainty in Scheduler's knowledge of WRS start time
 - 16 seconds to get an additional 4 PCD major frames (one PCD cycle) to make sure all temperature values required for radiometric correction of last scene are included



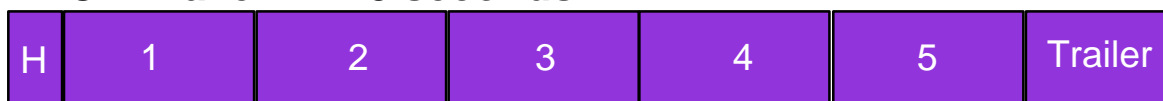
Impact on Scheduling of Intervals

- **Scheduler will calculate data start time as follows:**
 - calculate time at scene center of first requested WRS scene
 - backup 12 seconds to get to start of nominal scene
 - backup an additional 6 seconds to get to beginning of header data
 - this is the time assigned as data start time in the schedule
 - AOS will be scheduled 6 seconds before the calculated data start time
- **Scheduler will calculate data stop time as follows:**
 - calculate time at scene center of last requested WRS scene
 - add 12 seconds to get to end of nominal scene
 - add an additional 18 seconds to get to end of trailer data
 - this is the time assigned as data stop time in the schedule
 - LOS will be scheduled 1 second after the calculated data stop time



Intervals and Subintervals

- Interval is composed of continuous scenes along a WRS path acquired during a single ETM+ ON - to - ETM+ OFF period
- Interval: PCD Header = 6 seconds
Acquisitions = 24 seconds per WRS scene
PCD Trailer = 18 seconds



H = Header

- When an Interval must be broken into pieces, each piece is called a Subinterval.
- Reasons for creating Subintervals:
 - loss of sync during processing to L0R
 - not enough time within contact to bring down full Interval from recorder (applies to US only)
- Subinterval: PCD Header = 6 seconds
Acquisitions = 24 seconds per WRS scene
PCD Trailer = 18 seconds

